161a

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DISCUSSION

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DYNAMIC BEHAVIOR MODEL OF EPHEMERAL STREAM[a]

Closure by Kenneth G. Renard[5] and Emmett M. Laursen,[6] Members, ASCE

In their discussion, Smith and Chery frequently revealed their displeasure with the Laursen sediment transport relationships, but did not show reasons for this antipathy. However, inadvertantly, they introduced several points worth further discussion.

First, in referring to the Yang equation, they inferred it is "good" because it is "a sediment discharge model independent of bed material measurements." Then they proceeded to use Yang's Eq. 13 from Ref. 18, which indeed does not depend on the bed material. The writers cannot think of any other researchers who agree that the composition of the bed material is unimportant in determining the sediment-load transported by a stream. Other equations in Ref. 18 and subsequent papers by Yang included the bed material characteristics (21,22). Years ago, Zernial (23) and recently Laursen, et. al., (19) demonstrated the importance of the bed material characteristics, since most of the scatter in the sediment load-water discharge relationship of natural streams could be explained by changes in the composition of the bed material.

Also, Yang (18) repeated a figure from Ref. 17 where the Laursen relationship had been used incorrectly and, therefore, seemed inadequate for predicting field measurements on the Niobrara River. The Niobrara River study should remind us of the care we must take in working with field data. Maddock, in discussing Ref. 18, remarked that the staff gages used to obtain slope heaved in the winter. Also, the pond and falls above the naturally contracted gaging station on the Niobrara probably caused the pool-rapid effects, as discussed by Silverston and Laursen (20), with a measured total load not truly representative of the natural section. Other difficulties in interpreting the old Einstein field measurements were discussed in Ref. 5.

The reviewers stated ". . . the ratio of size composition of moving sediment to size composition of bed material . . . should be carefully studied." This type of an investigation was undertaken in the process of developing the paper. Fig. 5 showed the results of one undertaking. This figure showed that although the bed might contain a large amount of larger size material, Laursen's transport relation predicts that only a small percentage of this coarse material is being moved, a condition that apparently persists regardless of the discharge at the time in question. Although not unexpected, this figure showed that the composition of the finest size fractions in the bed are most important for determining the instantaneous concentration. The importance of this fine fraction led to the use of the large standard deviation, σ, as pointed out by the reviewers in Fig. 17.

[a]May, 1975, by Kenneth G. Renard and Emmett M. Laursen (Proc. Paper 11315).
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